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GEOSEQUESTRATION IN AUSTRALIA: EXISTING AND PROPOSED REGULATORY MECHANISMS

by

James Fahey* and Rosemary Lyster**

*Geosequestration*** involves the capture (from power stations and other facilities) and storage of carbon dioxide for very long periods of time in underground geological formations.*

This article is concerned with key legal and regulatory issues associated with establishing and operating geosequestration projects in Australia. It highlights the recent increased interest in, and raised profile of, using geosequestration as a greenhouse gas abatement measure in Australia. It reviews the cooperative efforts of the States, Territories and the Commonwealth to develop a nationally consistent regulatory framework for geosequestration projects, using existing petroleum legislation. These efforts have been driven by a lack of existing Australian legislation that provides an adequate and discrete regime dealing with the issues of responsibility and liability for geosequestered gas, although the release of draft legislation in this area is now imminent. It assesses some State legislative attempts to allow for the underground storage of carbon dioxide, and argues that these fail to satisfactorily deal with the long term (indefinite) nature of the storage aspect of geosequestration projects. Finally, this article examines the States' and Commonwealth's powers to legislate in respect of the injection and storage of carbon dioxide.

Key words: geosequestration, Carbon Capture and Storage (CCS), Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories Reporting, petroleum legislation, project specific legislation; State and Commonwealth powers

1 INTRODUCTION¹

Commercially viable and proven carbon dioxide geosequestration technology is not yet available in Australia.² One of the key reasons for this is that many of the available technologies for separating and capturing carbon dioxide are costly and of limited

* Partner, Mallesons Stephen Jaques. The views and opinions expressed in this paper are the author's and not necessarily those of Mallesons Stephen Jaques. The authors were assisted by Jessica Davies, Solicitor, Mallesons Stephen Jaques in writing this article. The article is a general overview and is not intended as legal advice.

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*** Also referred to as carbon capture and storage ("CCS"). The terms are used interchangeably in this paper.

¹ See also McLaren and James Fahey, 'Key Legal and Regulatory Considerations for the Geosequestration of Carbon Dioxide in Australia' (2005) 24 *ARELJ* 45; James Fahey and James McLaren, 'Geosequestration in Australia: Regulatory Overview and Models for Legislative Reform' (2005) *AMPLA Yearbook* 412; and Jessica Davies, 'Commonwealth Directions Powers and Section 101 of the Petroleum (Submerged Lands) Act (PSLA) : Issuing Directions to Companies' (2005) 24 *ARELJ* 195.

² For an overview of existing and planned geosequestration projects in Australia and abroad see: McLaren and Fahey, above at 49-50.

effectiveness.³ However, broader political concerns involving issues of public acceptance and the place of geosequestration within the wider greenhouse debate are also significant.⁴

Despite unanswered technical and political questions, geosequestration was placed squarely on the national agenda in Australia by the release, in 2004, of the Federal Government's eight year plan for Australia's future energy strategy. It came as no great surprise (although as a major blow to renewable energy advocates) that the White Paper, *Securing Australia's Energy Future* ("**Energy White Paper**"), confirmed that Australia's abundant fossil fuel resources would remain the mainstay of energy production in this country for the foreseeable future. However, as part of a suite of initiatives aimed at reducing the levels of carbon dioxide emissions, the Government announced that it was prepared to invest A\$500 million to promote the development of commercially viable, low cost abatement technologies including the use of coal-fired generation with geosequestration.⁵

Further, in recognition that the key technical, regulatory and policy issues associated with geosequestration are not particular to Australia, the Federal Government has demonstrated its eagerness to explore the viability of geosequestration technology at an international level, including by taking lead roles in significant international collaborative projects, namely:

- (a) the Carbon Sequestration Leadership Forum ("**CSLF**"), a ministerial-level international climate change initiative which focuses on the development and deployment of technologies for carbon capture and storage;⁶
- (b) the preparation by the Intergovernmental Panel on Climate Change ("**IPCC**") of a report on the feasibility and state of development of geosequestration technology;⁷ and
- (c) acting as Chair of the International Energy Agency's ("**IEA**") Legal Issues Subcommittee on Carbon Capture and Storage.⁸

In addition, the Federal Government is using various inter-governmental partnerships on climate change to explore solutions to technical and policy issues associated with geosequestration technologies. The most significant of these is the Asia-Pacific Partnership on Clean Development and Climate (AP6), founded in 2005, between Australia, China, the United States, India, Japan and the Republic of Korea which will focus on encouraging the use of new and existing technologies (including geosequestration) to abate greenhouse gas emissions. This forum may be used to address regulatory issues associated with deploying CCS technologies.

³ Victorian Department of Primary Industries, "Geosequestration: Putting the Carbon Back: A paper to discuss current issues and opportunities to reduce greenhouse gas emissions through geosequestration" (September 2004) 6, available at <http://www.dpi.vic.gov.au/minpet> (visited 27 July 2007).

⁴ In this regard see Peta Ashworth, Anne Pisarski and Anna Littleboy, *Understanding and Incorporating Stakeholder Perspectives to Low Emission Technologies in Queensland*, Centre for Low Emission Technology, Final Report, November 2006 available at <http://www.clet.net/publications.html> (visited 27 July 2007).

⁵ Indeed, even prior to the release of the Energy White Paper, the Federal Government had already committed significant resources to a number of programmes and initiatives to promote the research and development of geosequestration technology. For a brief overview of these initiatives see: McLaren and Fahey, above n 1, 48.

⁶ See <http://www.cslforum.org>.

⁷ Australia acted as the "Co-ordinating Lead Author" for the chapter of the IPCC Special Report on Carbon Dioxide Capture and Storage dealing with geological storage of carbon dioxide. The Report is available at http://www.mnp.nl/ipcc/pages_media/SRCCS-final/ccsspm.pdf (visited 27 July 2007)..

⁸ This Committee was established by the IEA in June 2005. The final report, published in 2007, is entitled *Legal Aspects of Storing CO2* and is available at http://www.iea.org/Textbase/publications/free_new_Desc.asp?PUBS_ID=1928 (visited 27 July 2007).

The State Governments in Australia have also shown that they are keen to explore the viability of using geosequestration as a means of reducing greenhouse gas emissions, for example, by:

- releasing discussion papers;⁹
- establishing significant research centres to facilitate the research and development of economically viable greenhouse gas abatement technologies (including technologies for the geosequestration of carbon dioxide);¹⁰ and
- committing funds to trial geosequestration projects.¹¹

There has been some scepticism, however, about the advisability of adopting geosequestration as a major technological response to escalating greenhouse gas emissions. The Australia Institute, for example, which is an independent economist ‘think tank’ released a report¹² which found that geosequestration is a very complex process. Capturing carbon dioxide from existing power stations would require the use of large and expensive equipment and use large amounts of energy, thereby reducing overall power station efficiency. The transport of the carbon dioxide will be energy intensive and require large investment in pipeline infrastructure. At present there are no identifiable sites within 500 kilometres of 39% of Australia’s current net emissions of carbon dioxide from electricity generation. The main barriers to a large-scale application of geosequestration are the immaturity of the technology, the energy penalty and the cost of capture. The earliest possible date for the operation of any pilot projects is 2014-2015. The report states that it is clear that coal-fired generation with CCS will be more costly than a number of other low-emission electricity generation options including natural gas-fired combined cycle gas turbines, gas-fired cogeneration, wind and many types of biomass, especially as many of these technologies are already commercially proven. For this reason, the use of currently available technologies will reduce emissions much sooner and at lower cost, and make any abatement task for geosequestration more difficult.

2 KEY REGULATORY ISSUES RELATING TO GEOSEQUESTRATION

On 25 September 2005, the IPCC released a comprehensive report on Carbon Capture and Storage. Indicating the level of international interest in CCS, the IPCC also released the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Reporting.¹³ The CCS report begins by describing CCS, its characteristics, how it could contribute to mitigating climate change, the current status of the technology and the geographical relationship between the sources and storage opportunities for CO₂ (hereafter carbon). The Report then addressed the following key issues: What are the costs for CCS and what is the technical and economic potential?; What are the local health, safety and environment risks of CCS?; Will physical

⁹ See, for example, the Victorian Department of Primary Industries discussion paper, above n 3; and “Geosequestration of Carbon Dioxide - Key Technical, Legislative and Policy Issues” which was released by the Western Australian Government in October 2003.

¹⁰ These include the Victorian Government’s Centre for Energy and Greenhouse Technologies which provides funding for the development of new sustainable energy and greenhouse gas reduction technologies (including geosequestration): see <http://www.cegt.com.au> (visited 27 July 2007); and the Queensland Centre for Low Emission Technology, a partnership between the CSIRO and the Queensland Government, which seeks to facilitate research, development and demonstration of key technologies (including geosequestration) that will lower greenhouse gas emissions for coal-based power generation: see http://www.sd.qld.gov.au/innovation/research/low_emission.asp (visited 27 July 2007).

¹¹ The Victorian Government announced that it is contributing \$4 million to a trial geosequestration project in the Otway Basin. For more details see: <http://www.business.vic.gov.au/etis> (visited 27 July 2007).

¹² See also: ‘Geosequestration: what is it and how much can it contribute to a sustainable energy policy for Australia?’ (Australia Institute: September 2004).

¹³ Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.htm> (visited 21 August 2007).

leakage of stored carbon compromise CCS as a climate change mitigation option?; What are the legal and regulation issues for implementing carbon storage?; What are the implications of CCS for emissions inventories and accounting? and What are the gaps in knowledge?

For our purposes the most important aspect of the IPCC report are those that relate to the legal and regulatory issues associated with the implementation of CCS. Essentially, the IPCC report stated that the process and impacts of CCS may be managed under mining, oil and gas, pollution control, waste disposal, drinking water, treatment of high-pressure gases and subsurface property rights law. Given this, the authors will investigate the extent to which Australian law currently covers the legal issues pertaining to the regulation of geosequestration, and the measures which still need to be undertaken in this regard.

3 TOWARDS A NATIONAL REGULATORY APPROACH FOR GEOSEQUESTRATION

In September 2003, the Ministerial Council on Mineral and Petroleum Resources (“**MCMPR**”) announced the establishment of a Carbon Dioxide Geosequestration Regulatory Working Group (“**Regulatory Working Group**”) to produce a framework of nationally agreed standards, regulations and, if appropriate, legislation to guide the development of carbon dioxide geosequestration projects in Australia.¹⁴ The establishment of the Regulatory Working Group was part of the Federal, State and Territory Governments’ response to an increased impetus from governments, industry and consumers to develop geosequestration technology into a commercially viable method of abating the increase in atmospheric concentrations of carbon dioxide released from stationary energy sources.

In generating its Draft Guiding Regulatory Framework, the Regulatory Working Group acknowledged that the most significant issue was how to allocate responsibility at various stages in a carbon dioxide geosequestration project between private industry proponents and government. In doing so, it sought to develop principles that provide:

- (a) certainty for stakeholders;
- (b) public confidence that natural resources, the environment and human health and safety will be adequately protected; and
- (c) an environment that encourages investment in the research and development of geosequestration technology.¹⁵

In December 2005, the MCMPR released a final statement of *Regulatory Guiding Principles* (“**RGP**s”) in order to achieve a nationally consistent approach to the implementation of this technology. The RGP’s take into account principles of Ecologically Sustainable Development, the Intergovernmental Agreement on the Environment, Principles of Good Regulation and relevant COAG Occupational Health and Safety Principles. They are grouped under the following headings:

Assessment and Approvals Process

The MCMPR agreed that the assessment and approvals process must be consistent with agreed national protocols and guidelines, while existing regulations and legislation which apply to CCS need to be identified and modified or expanded where necessary.

¹⁴ See <http://www.industry.gov.au/ccs>.

¹⁵ Draft Guiding Regulatory Framework, page 3.

Access and property rights

Holders of rights to surface and subsurface rights for CCS must be given certainty with regard to their entitlements and obligations, which must be based on legislative arrangements, custom and practice.¹⁶ These should recognise the likelihood of multi-user CCS infrastructure and facilities arising. Land use planning issues must be considered when governments grant permission to inject CCS stream into the subsurface formations.

Transportation issues

The transportation of a CCS stream should be consistent with nationally agreed protocols and guidelines.

Monitoring and verification

The possible environmental, health, safety and economic risks relating to CCS should be monitored and verified and the information should be made publicly accessible. The regulatory framework should establish the quantity, composition and location of gas captured, transported, injected and stored and the net abatement of emissions, including identification and accounting of leakage as accurately as possible.

Liability and post-closure responsibilities

Liability for all stages of CCS projects must continue to be governed by current regulatory principles and the common law. Post-closure storage of CCS streams must aim to minimise exposure to health, environmental and financial risks for project operators, governments and future generations.

Financial issues

Wherever possible, existing legislative, regulatory and accounting processes should apply to a CCS project rather than introducing new regulations, while CCS projects should be treated like any other business venture for taxation purposes. Financial instruments should be considered to assist with the management of post-closure risks.

4 EXISTING SOURCES OF LIABILITY AND RESPONSIBILITY THAT ARE LIKELY TO IMPACT ON GEOSEQUESTRATION PROJECTS IN AUSTRALIA

Other than the limited exceptions discussed below, there is currently no legislation in Australia that specifically governs the regulatory issues associated with the geosequestration of carbon dioxide set out in the MCMPR's *Regulatory Guiding Principles*. However, it is important to note that the Federal government is currently drafting amendments to the *Offshore Petroleum Act 2006* (Cth) ("**Offshore Petroleum Act**") in order to give legislative effect to these principles in respect of Commonwealth offshore areas. The reason that the Federal legislation refers only to offshore areas is that the state governments have jurisdiction over all onshore geosequestration sites, including offshore areas to an extent of three nautical miles. The Federal government's jurisdiction extends from the three nautical mile limit outwards to the continental shelf. To establish a nationally consistent scheme, complementary state legislation must be enacted. The *Offshore Petroleum Act 2006* is intended to replace, in form but not in substance, the *Petroleum (Submerged Lands) Act 1967* (Cth) ("**PSLA**"), but it has not yet itself commenced. This is because each relevant State and Territory government has not yet enacted mirror legislation. This is delaying, the adoption of a nationally consistent approach, and will continue to do so if the State and Territory governments do not respond

¹⁶ In most cases, a project developer will need to acquire access right from the owner of the land on which the storage site is situated.

expeditiously to the Federal government proposed amendments to the Offshore Petroleum Act 2006. While the content of the CCS amendments is not clear at this stage, since they have not been released in Bill form, the controversial issues of long term liability, dual licensing and access within the context of existing oil and gas exploration, development and production permit holders' need for paramountcy of title are likely to be key industry and stakeholder concerns.

Nonetheless, there are numerous other existing regulations that are likely to impact on geosequestration projects in Australia. These arise both under domestic law (under legislation and at common law), as well as at international law, and are driven by the key risks associated with each stage of a geosequestration project.¹⁷

In summary, the main existing sources of responsibility and liability that are likely to be relevant to geosequestration project proponents include:

- (a) Australian common law (particularly the torts of trespass, nuisance and negligence);¹⁸
- (b) State and Commonwealth environmental legislation, including regulations dealing with:
 - (i) environmental harm generally;¹⁹
 - (ii) pollution²⁰ and waste;²¹
 - (iii) interference with aquifers;²²
 - (iv) contaminated land;²³ and
 - (v) environmental licences and authorisations;²⁴

¹⁷ For an overview of the key sources of existing potential legal liability (that is, in the absence of further regulation) relevant to geosequestration projects in Australia and selective examples of how these sources might apply see: McLaren and Fahey, above n 1, 53-64. See also the Carbon Capture and Storage Report to the Australian Greenhouse Office on Property Rights and Associated Liability Issues prepared by Minter Ellison and released by the Australian Greenhouse Office in July 2005.

¹⁸ See the discussion in McLaren and Fahey, above n 1, 60-64.

¹⁹ See, for example, *Protection of the Environment Operations Act* 1997 (NSW), section 116(1).

²⁰ See, for example, *Environment Protection Act* 1993 (SA); *Environmental Protection Act* 1994 (Qld); *Environmental Management and Pollution Control Act* 1994 (Tas); *Environment Protection Act* 1997 (ACT).

²¹ See, for example, *Environment Protection Act* 1970 (Vic) sections 4, 39(1), 41(1), 45(1); *Waste Avoidance and Resource Recovery Act* 2001 (NSW) section 5.

²² Water legislation in Australia generally prohibits the use of, and interference with, any water above or below the ground, including that contained in an aquifer; see for example, *Water Management Act* 2000 (NSW); *Water Act* 2000 (Qld); *Water Resources Act* 1997 (SA); *Water Act* 1989 (Vic). Any geosequestration project which interferes with an aquifer will need approval, although this is not currently provided for in the legislation.

²³ See, for example, the *Contaminated Land Management Act* 1997 (NSW); *Environmental Protection Act* 1994 (Qld) Chapter 7, Part 8; *Environmental Protection Act* 1970 (Vic) sections 45 and 62A.

²⁴ The various State environmental regimes provide that activities of 'environmental significance' may not be undertaken without a licence or environmental authorisation: *Protection of the Environment Operations Act* 1997 (NSW), Chapter 3; *Environmental Protection Act* 1993 (SA), Part 6; *Environmental Protection Act* 1994 (Qld), sections 426, 427; *Environmental Protection Act* 1970 (Vic), section 19A-20; *Environmental Protection Act* 1997 (ACT), Part 8; *Environmental Protection Act* 1986 (WA), sections 53-58.

- (c) other State and Commonwealth legislation, including statutes dealing with:
 - (i) the transport, exploration and production of minerals and petroleum;²⁵
 - (ii) land use and development;²⁶
 - (iii) native title and heritage protection;²⁷
 - (iv) explosives and dangerous goods;
 - (v) the regulation of foreign investment;²⁸
 - (vi) third party access; and
 - (vii) tax; and
- (d) international law (especially where the relevant geosequestration project is proposed offshore), including under:
 - (i) the United Nations Convention on the Law of the Sea 1982 (“**UNCLOS**”);
 - (ii) the Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter 1972 (“**London Convention**”);
 - (iii) the Protocol to the London Convention 1996 (“**London Protocol**”), although it is important to note that in April 2006, Australia proposed the amendment of *Annex 1 - Wastes or other matter that may be considered for dumping*, to expand the list of wastes to include carbon-dioxide streams sequestered in subseabed geological formations (offshore geosequestration). On 2 November 2006 the amendment was adopted unanimously, under the Rules of Procedure for the Protocol. The amendment entered into force on 11 February 2007; and
 - (iv) other treaties that may apply.²⁹

²⁵ Australia’s petroleum legislation is discussed in section 5, below.

²⁶ The establishment of a geosequestration project (whether by the expansion of an existing facility that produces carbon dioxide or as a new operation) is likely to require development approval and an environmental impact assessment under separate development and planning legislation in each State and Territory. The principal planning Acts are the *Environmental Planning and Assessment Act* 1979 (NSW); the *Integrated Planning Act* 1997 (Qld); the *Development Act* 1993 (SA); the *Planning and Environment Act* 1987 (Vic); the *Land (Planning and Environment) Act* 1991 (ACT); the *Planning and Development Act* 2005 (WA); and the *Australian Capital Territory (Planning and Land) Management Act* 1988 (Cth). Assessment and approval by the Federal government may be required under the *Environment Protection and Biodiversity Conservation Act* 1999 (Cth) if the project impacts of a matter of national environmental significance such as threatened species, or Ramsar wetlands.

²⁷ Among others, there are procedural mechanisms created by the *Native Title Act* 1993 (Cth) and the statutory schemes in each Australian jurisdiction designed to protect Aboriginal cultural values and cultural heritage.

²⁸ Foreign investment into Australia is regulated by the *Foreign Acquisition and Takeovers Act* 1975 (Cth) and by the Australian Federal Government’s Foreign Investment Policy, which seeks to encourage foreign investment into Australia in a manner that is consistent with the needs of Australia.

²⁹ See McLaren and Fahey, above n 1, 66-67.

5 THE REGULATION OF GEOSEQUESTRATION PROJECTS UNDER EXISTING AUSTRALIAN PETROLEUM LEGISLATION

5.1 Overview

As mentioned above, according to the MCMPR, the existing petroleum regime in Australia provides an adequate starting point for developing a legislative framework for Australian geosequestration projects.³⁰

In the context of the comments made by the MCMPR, this section provides a brief overview of the legal regime applicable to petroleum exploration and production in Australia and the extent to which (in the absence of further reform) existing Australian petroleum legislation provides a satisfactory regime for Australian geosequestration projects. As part of this review, this section contrasts the approaches adopted by the Parliaments of Queensland and South Australia to adapt existing petroleum legislation to provide for carbon capture and storage on the one hand with the “project specific/State Agreement” approach adopted by the Western Australian parliament on the other hand.

5.2 The legal regime applicable to petroleum exploration and production in Australia

In general terms, the regulation of petroleum exploration and production in Australia is governed by different legislative regimes depending upon where the relevant activities are conducted.

The Northern Territory and each State except Tasmania have their own legislation that expressly deal with the exploration for and production of petroleum onshore.³¹ This onshore legislation is administered by the relevant State or Territory government and covers all land inland from the ordinary low-water mark including all bays and harbours adjacent to that State or Territory.

The current offshore legal regime applicable to petroleum exploration, production and transportation is somewhat different, having been developed as a consequence of an extended dispute during the 1960’s and 1970’s between the Commonwealth on the one hand and the States and the Northern Territory on the other hand regarding legislative power over offshore resources.³²

³⁰ See Fahey and McLaren, above n 1, 421.

³¹ The current statutes are: *Petroleum Act 1984* (NT); *Petroleum (Onshore) Act 1991* (NSW); *Petroleum Act 1923* (Qld); *Petroleum and Gas (Production and Safety) Act 2004* (Qld); *Petroleum Act 2000* (SA); *Petroleum Act 1998* (Vic); *Petroleum Act 1967* (WA). In Tasmania, onshore petroleum is regulated by the general mining legislation: *Mineral Resources Development Act 1995* (Tas).

³² The position offshore was first determined by an agreement in 1967 between the Commonwealth and the States (including the Northern Territory) providing the administrative basis for offshore petroleum exploration and production: *Agreement relating to the Exploration for, and Exploitation of, the Petroleum Resources, and certain other Resources, of the Continental Shelf of Australia and of certain Territories of the Commonwealth and of certain other Submerged Land*. This resulted in the *Petroleum (Submerged Lands) Act 1967* (Cth) and ‘mirror’ legislation in each State and the Northern Territory. The reasoning was the need to protect the holders of offshore petroleum titles in light of uncertainty as to whether the Commonwealth government or the States had legislative power over offshore resources. However, in 1973 the Commonwealth government sought to resolve the question of offshore jurisdiction by enacting legislation declaring that sovereignty in respect of the territorial sea and sovereign rights to explore the continental shelf and exploit its natural resources are vested in the Crown in right of the Commonwealth: *Seas and Submerged Lands Act 1973* (Cth). The validity of this legislation was subsequently upheld by the High Court in *New South Wales v Commonwealth (Seas and Submerged Lands Case)* (1975) 135 CLR 337. Notwithstanding judicial confirmation of the Commonwealth’s offshore jurisdiction, in the face of discord from the States, it was agreed to establish a joint

This dispute was ultimately settled by the establishment of a legislative regime which divided the Australian territorial sea bed and continental shelf into “adjacent areas” (now referred to as “offshore areas” under the Offshore Petroleum Act). Every State and the Northern Territory has its own adjacent area which extends from the mean low watermark to the three mile limit and within which State titles may be created. Within these areas State law applies under the administration of the responsible Minister of the State or Territory Minister (the Designated Authority). Beyond that area lies the Commonwealth offshore area which extends outwards from the three mile limit to the outer limits of the continental shelf. A Joint Authority, comprising the Designated Authority and the responsible Commonwealth Minister, is responsible for the administration of Commonwealth offshore waters.

Petroleum exploration and production in Commonwealth offshore areas is governed by the *Petroleum (Submerged Lands) Act 1967* (Cth) (“PSLA”) (soon to be replaced by the Offshore Petroleum Act as explained above) which is administered by the Joint Authority. The same activities conducted in State adjacent areas are governed by legislation substantially identical to the PSLA as amended in 1980 which has been enacted in each State and the Northern Territory.³³ This ‘mirror’ legislation is administered by the relevant State or Territory.

Despite the existence of multiple legislative schemes governing petroleum exploration and production, it is possible to extract a number of fundamental features common to each regime, including:

- the entitlement of government to petroleum in its natural state;³⁴
- a title system which prescribes the terms and conditions upon which the explorer or producer may exploit the government’s petroleum resources;³⁵ and
- that royalties or taxes must be paid to the Crown for petroleum produced.³⁶

Commonwealth-State scheme relating to the mineral and petroleum resources of the Australian territorial sea. This was agreed at the October 1977 Premier’s Conference and is reflected in the recitals to the Petroleum (Submerged Lands) Act of each State. The agreement was effected by complementary State and Commonwealth legislation that provided in effect that the provisions of laws in force in the State from time to time (other than criminal laws and laws of the Commonwealth) apply to the coastal sea as if the coastal sea were part of the State: The relevant Commonwealth pieces of legislation are the *Coastal Waters (State Title) Act 1980* (Cth) and the *Coastal Waters (State Powers) Act 1980* (Cth).

³³ The current statutes are: *Petroleum (Submerged Lands) Act 1981* (NT); *Petroleum (Submerged Lands) Act 1982* (NSW); *Petroleum (Submerged Lands) Act 1982* (Qld); *Petroleum (Submerged Lands) Act 1982* (SA); *Petroleum (Submerged Lands) Act 1982* (Tas); *Petroleum (Submerged Lands) Act 1982* (Vic); *Petroleum (Submerged Lands) Act 1982* (WA).

³⁴ All Australian States have declared that petroleum in place is owned by the Crown without exception regardless of when the land containing such petroleum may have passed into private ownership: *Petroleum Act 1923* (Qld) sections 5,6; *Petroleum and Gas (Production and Safety) Act 2004* (Qld) section 26; *Petroleum Act 2000* (SA) section 5; *Petroleum Act 1998* (Vic) section 13; *Petroleum Act 1984* (NT) section 6. In Tasmania, some mineral substances on or below the surface of land, including oil (but not petroleum), are deemed to vest in the Crown, otherwise all minerals held in private ownership continue to be so held: *Mineral Resources Development Act 1995* (Tas) sections 6(1), 6(4). The Commonwealth has sovereignty over the territorial sea and sovereign rights in respect to the continental shelf and the exclusive economic zone.

³⁵ For this reason, the regulatory regime applicable to exploration for and production of petroleum in Australia can be described as a “concessionary” regime: See Terence Daintith, ‘A Critical Evaluation of the Petroleum (Submerged Lands) Act as a Regulatory Regime’ (2000) *AMPLA Yearbook* 91.

³⁶ In the case of the Northern Territory regime and each of the State regimes, royalty provisions are contained in each of the relevant petroleum statutes. See, eg, *Petroleum Act 2000* (SA) Part 7. Offshore, other than in limited circumstances, the Commonwealth derives revenue under the *Petroleum Resource Rent Tax Assessment Act 1987* (Cth).

5.3 Provisions for the underground storage of gas

In addition to the common features referred to above, the petroleum legislation in most Australian jurisdictions contain provisions which deal to some degree with the underground storage of gas.³⁷ By and large, these provisions deal only with storage of naturally occurring hydrocarbons or mixtures of hydrocarbons (such as natural gas). However, Queensland and South Australia have each recently put in place provisions dealing with the underground storage of other gases, including carbon dioxide, as part of broader petroleum legislative reform processes.³⁸

Provisions in existing petroleum legislation dealing with the underground storage of gas have drawn the attention of a number of commentators.³⁹ Generally, these provisions have been criticised on various bases, including that they do not:

- provide sufficient certainty of rights to inject, store and recover gas;
- adequately deal with ownership rights in stored gas; and
- provide an adequate general regime for gas storage.

5.3.1 Rights to inject and store gas in New South Wales

The relevant provisions in the *Petroleum (Onshore) Act* 1991 (NSW) (“**Petroleum Act (NSW)**”) provide a good example of why existing legislative attempts at regulating underground gas storage have been criticised for being uncertain and inadequate.⁴⁰

(a) Rights to inject and store gas

The Petroleum Act (NSW) expressly recognises that natural gas (but not carbon dioxide unless existing as part of a naturally occurring mixture with a hydrocarbon) may be returned to a natural reservoir.⁴¹ Under section 3(1):

petroleum means:

³⁷ The exceptions are the *Petroleum Act* 1984 (NT) and the *Mineral Resources Development Act* 1995 (Tas).

³⁸ The relevant regimes in Queensland and South Australia are discussed in section 5.3.2, below.

³⁹ See, eg Katherine Graff, ‘Under Pressure: Developments in Regulating Underground Gas Storage’ (2001) *AMPLA Yearbook* 503; Dan Howard, ‘Underground Gas Storage - Legal and Regulatory Requirements in Australia’ (1999) *APPEA Journal* 663; Thomas Kennedy, ‘Filling Cavities: Storing Natural Gas Naturally’ (1999) *AMPLA Yearbook* 521; Robert M. Willcocks, ‘Underground Gas Storage in Australia’ (1988) *Journal of Energy and Natural Resources Law* 77; Darren Murphy, ‘Regulation of Commercial Gas Storage Operations in Western Australia’ (2001) 20 *AMPLJ* 65.

⁴⁰ Ultimately, the criticisms that can be made of the relevant provisions dealing with underground gas storage that are contained in *Petroleum (Onshore) Act* 1991 (NSW) (lack of clear rights and inadequate general regime for underground gas storage) can be made in respect to the relevant provisions of the applicable petroleum legislation in each of Victoria, Western Australia, Northern Territory offshore. It should be noted, however, that the *Petroleum Act* 1998 (Vic) specifically empowers the Minister to authorise commercial underground gas storage (see section 8) thus overcoming some of the criticisms of the *Petroleum (Onshore) Act* 1991 (NSW). The *Petroleum Act* 1998 (Vic) also includes other detailed provisions dealing with the underground storage of petroleum: sSee, eg, sections 7, 18 (the holder of an exploration licence can explore for underground reservoirs); and sections 8, 46 (the holder of a production licence can inject and store petroleum and later recover that stored petroleum). For a detailed review of the relevant provisions of the *Petroleum Act* 1998 (Vic), see Graff, above n 40 at 503; and Howard, above n 40 at 663.

⁴¹ The *Petroleum (Onshore) Act* 1991 (NSW) refers only to ‘natural’ reservoirs. This clearly does not include man-made reservoirs and there is some uncertainty as to the application of the *Petroleum (Onshore) Act* 1991 (NSW) to aquifer storage: See Howard, above n 40 at 666.

- (a) *any naturally occurring hydrocarbon, whether in a gaseous, liquid or solid state;*
- (b) *any naturally occurring mixture of hydrocarbons, whether in a gaseous, liquid or solid state;*
- (c) *any naturally occurring mixture of one or more hydrocarbons, whether in a gaseous, liquid or solid state, and one or more of the following, that is to say, hydrogen sulphide, nitrogen, helium, carbon dioxide and water,*

and includes any substance referred to in paragraph (a), (b) or (c) that has been returned to a natural reservoir, but does not include coal or oil shale or any substance prescribed to be a mineral for the purposes of the Mining Act 1992.

Section 87(2) goes further. Royalties are not payable on petroleum that has been returned to a natural reservoir. The sub-section is expressed in terms that where petroleum that “has been recovered by the holder of a petroleum title is, with the approval of the Minister, returned to a natural reservoir, [a] royalty is not payable in respect of that petroleum by reason of that recovery...”.

Section 28A provides that, in addition to the other rights conferred by a title granted pursuant to the Petroleum Act (NSW), every petroleum title confers on its holder the right to carry on such operations as are necessary to explore the land comprised in the title for the existence and availability of natural reservoirs.

However, apart from the provisions referred to above, there is little else in the Petroleum Act (NSW) which deals with underground gas storage.⁴²

The rights of a petroleum production leaseholder are contained in section 41 which provides that the holder has “the exclusive right to conduct petroleum mining operations in and on the land included in the lease” together with various associated rights, including the construction and maintenance on the relevant land such plant, pipelines and other works “as are necessary for the full enjoyment of the lease or to fulfil the lessee’s obligations under it.”

The term “petroleum mining operations” in section 41 is not defined in the Petroleum Act (NSW). It has been argued on the basis of provisions contained in taxation legislation,⁴³ and judicial consideration,⁴⁴ that the term does not extend to the injection and storage of stored gas.⁴⁵ Accordingly, there is doubt as to whether the relevant Minister could, under the powers conferred by the Petroleum Act (NSW), authorise the injection or storage of gas through the grant of a petroleum lease.

There is a further question as to the power of the Minister to authorise the underground storage of gas where doing so involves the disposal of any interest in Crown lands or the modification of private rights. To the extent that underground storage involves such a disposal or modification and the Petroleum Act (NSW) does

⁴² Indeed, the long title of the *Petroleum (Onshore) Act 1991* (NSW) states that, among other things, it is an Act “to regulate the search for and mining of petroleum...”; there is no reference to underground gas storage.

⁴³ See Willcocks, above n 40 at 90.

⁴⁴ Ibid.

⁴⁵ Ibid at 89.

not confer an unambiguous power to that effect, there is a strong argument that the Minister is not empowered to authorise the injection and storage of gas.⁴⁶

It might be argued on the basis of the reference in section 87(2) to the Minister's approval to the return of petroleum to a natural reservoir that the injection and storage of petroleum could otherwise be authorised under the Petroleum Act (NSW). However, the better view is that section 87(2) does no more than describe the circumstances that a royalty will not be payable.⁴⁷

Section 28A provides a stronger implication that the Minister is empowered under the Petroleum Act (NSW) to grant rights to inject and store petroleum in underground reservoirs. However, any implication of this nature must be read down by section 41. That is, the Minister's power to authorise injection and storage of gas is limited to where these activities are necessary for the full enjoyment of the petroleum lease.

The conclusion is that the absence of an express right in the Petroleum Act (NSW) to inject and store gas means that, at best, the Minister has limited powers to authorise a lessee to conduct injection and storage activities where these are ancillary to the primary petroleum mining activities associated with the lease. This might, for example, extend to injection and storage for the avoidance of waste of gas or compliance with good oilfield practice.⁴⁸ However, it would not extend to the underground storage of gas for commercial purposes (including geosequestration).

(b) Ownership of stored gas

Section 6(1) of the Petroleum Act (NSW) states that all "petroleum, helium and carbon dioxide existing in a natural state on or below the surface of any land in the State is the property of the Crown, and is taken to have been so always."⁴⁹

In relation to the underground storage of gas (petroleum, helium or carbon dioxide) that is owned by someone other than the Crown immediately prior to injection, it is not clear whether or not the effect of section 6(1) is to vest in the Crown ownership of the stored gas. The relevant question is whether or not the relevant gas, once recovered, ceases to "exist" in its "natural state" and does not take on that natural state again when it is injected.⁵⁰

It has been suggested that the better view in respect to returned petroleum is that ownership does not pass upon injection.⁵¹ It is submitted that the same conclusion is

⁴⁶ This issue is discussed in further detail in section 6 of this paper.

⁴⁷ See *Petroleum (Onshore) Act* 1991 (NSW) sections 75 and 76, which provide that the Minister may include conditions in titles for protecting the environment. See also, Kennedy, above n 40 at 530.

⁴⁸ Willcocks, above n 40 at 91.

⁴⁹ Compare *Petroleum Act* 1998 (Vic) section 13, which provides that all petroleum on or below the surface of the land that is there "without human assistance" is the property of the Crown. There is no argument under the *Petroleum Act* 1998 (Vic) that property in injected petroleum reverts to the Crown upon injection.

⁵⁰ The alternative interpretation is that the gas, when injected and stored, is converted back into (or remains in) its natural state where its physical nature is not different from that of other (unrecovered) gas in the reservoir. In this case property in the stored gas would vest (or continue to vest) in the Crown.

⁵¹ This is on the bases of: (a) an interpretation of the words contained in *Petroleum (Onshore) Act* 1991 (NSW) section 6(1); and (b) the High Court's decision in *Wade v NSW Rutile Mining Company Ltd and Others* (1969) 121 CLR 177 that is authority for the proposition that a person cannot be deprived of ownership rights unless effected by unambiguous language. See Willcocks, above n 40 at 86, 89-90.

reached in respect to stored carbon dioxide.⁵² However, this is not without some doubt.

(c) **General regime for gas storage**

Whatever rights (if any) the Petroleum Act (NSW) provides to inject or store gas, it is clear that the Act does not contain detailed provisions that provide a general regime for underground gas storage or contemplate the activities associated with geosequestration projects.

5.3.2 Storage and injection in South Australia and Queensland

(a) **South Australia**

The South Australian regime for the exploration and production of petroleum is embodied in the *Petroleum Act* 2000 (SA) (“**Petroleum Act (SA)**”). The Petroleum Act (SA) is markedly different to other Australian petroleum legislation, most apparently in its bald, simple drafting style and that it provides for an objectives-based approach to regulation in preference to the traditional prescriptive approach.⁵³ As summarised below, it also provides a detailed regime for underground storage of carbon dioxide.

The Petroleum Act (SA) specifically empowers the Minister to authorise the storage of “regulated substances” in “natural reservoirs”⁵⁴ for commercial purposes.⁵⁵ “Regulated substances” are defined in section 4(1) of the Petroleum Act (SA) to include carbon dioxide.

In contrast to the position in the Petroleum Act (NSW), a “natural reservoir” under the Petroleum Act (SA) includes one that has been artificially modified.⁵⁶ This would extend to salt caverns and aquifers but arguably not to coal mines (which are entirely man-made, not just modified).⁵⁷

For similar reasons applicable to the Petroleum Act (NSW), under the Petroleum Act (SA), the better view is that ownership of injected carbon dioxide does not vest in the Crown but that property in the carbon dioxide remains with the person who owned the gas upon injection.⁵⁸ However, again this is not without some doubt.

Other key features of the regime for the underground storage of carbon dioxide under the Petroleum Act (SA) include that:

⁵² In particular, it is difficult to see how an accumulation of large amounts of carbon dioxide, which has been produced as a by-product of a refining or energy producing process, in an underground reservoir can be said to be existing in its “natural state”.

⁵³ See generally, Peter H Holden, ‘The South Australian Petroleum Act 2000: A New Approach’ (2000) *AMPLA Yearbook* 557.

⁵⁴ In contrast to the position in the *Petroleum (Onshore) Act* 1991 (NSW), “natural reservoirs” under the *Petroleum Act* 2000 (SA) includes one that has been artificially modified: see section 4(1) (definition of “natural reservoir”). This would extend to salt caverns and aquifers but arguably not to coal mines (which are entirely man-made, not just modified): Graff, above n 40 at 514.

⁵⁵ *Petroleum Act* 2000 (SA) section 34(1)(c).

⁵⁶ Ibid section 4(1) (definition of “natural reservoir”)

⁵⁷ See Graff, above n 40 at 514.

⁵⁸ The analysis here is similar to the analysis of the *Petroleum (Onshore) Act* 1991 (NSW): the relevant question is whether carbon dioxide that has been injected into an underground reservoir can be said to be “naturally occurring”: see *Petroleum Act* 2000 (SA), sections 4(1) (definitions of “regulated resource” and “regulated substance”), 5(1).

- exploration licence holders are authorised to explore for natural reservoirs and conduct activities to establish the nature and extent of the reservoir;⁵⁹
- retention licences are available for underground reservoirs for the purpose of allowing proper evaluation of the discovery and development of the reservoir to a commercial stage;⁶⁰
- no fee or royalty is payable on the use of a reservoir to store carbon dioxide but a royalty will be payable should the carbon dioxide be later produced;⁶¹
- a person engaging in the underground storage of carbon dioxide pursuant to the Petroleum Act (SA) would need to comply with the detailed provisions of the Petroleum Act (SA) regarding environmental protection and rehabilitation which would apply generally to the underground storage of carbon dioxide;⁶² and
- the Petroleum Act (SA) contains provisions dealing with third party access to reservoirs for storage of gas.⁶³

Two final issues on the regime for underground storage of gas under the Petroleum Act (SA) are worth noting. The first is the requirement that an applicant for a production licence must demonstrate that the relevant activities to be conducted under the licence are, or will be within 24 months, commercially feasible.⁶⁴ Further, a production licence may be cancelled if “productive operations resulting in production from the licence area on a commercial basis have not been carried on within the area of a production licence for 24 months or more”.⁶⁵ It is not clear how these commerciality requirements will be applied in the circumstance where the injection and storage of carbon dioxide are the only activities conducted pursuant to a particular production licence.⁶⁶

The second issue is that the focus of the regime established under the Petroleum Act (SA) is on the *storage* of, among other regulated substances, carbon dioxide. However, in essence, the focus of a proponent of a geosequestration project is on the *disposal* of carbon dioxide (as a waste product). The Petroleum Act (SA) does not, for example, provide clear provisions in relation to what happens to injected carbon dioxide on the termination of a production licence, including provisions which deal

⁵⁹ *Petroleum Act 2000* (SA) section 21(1).

⁶⁰ *Ibid* section 28.

⁶¹ *Ibid* section 43(1). It has been argued that, on the basis of section 43(1), a royalty could be levied on the value of using the reservoir for underground storage: Graff, above n 40 at 518. However, the better view is that section 43(1) (which refers to “the value (at the well head) of a regulated resource produced from land”) is concerned only with substances that are exploited from the land the subject of the licence and not to use of part of the land (the reservoir) itself. This is consistent with the remainder of section 43, for example, section 43(6) which deals with the method for calculating royalty. In addition, there is a question as to whether a royalty on the value of using the reservoir for underground storage would be a “duty of excise” within section 90 of the Commonwealth Constitution and thus invalid.

⁶² See *Petroleum Act 2000* (SA), Part 12.

⁶³ *Ibid*, section 79.

⁶⁴ *Petroleum Act 2000* (SA), section 35(1)(d).

⁶⁵ *Ibid*, section 41(1).

⁶⁶ The *Petroleum Act 2000* (SA) does not indicate how commerciality is to be assessed. While it is likely that the term “commercial” will be interpreted broadly, the requirement adds an additional level of uncertainty that may impact a decision to invest in a geosequestration project in South Australia: See generally, Holden, above n 53 at 571-2.

with the liability for the risks associated with the long term (indefinite) storage time proposed for geosequestration⁶⁷ or ongoing monitoring requirements.⁶⁸

(b) Queensland

The relevant Queensland regime is contained in the *Petroleum and Gas (Production and Safety) Act 2004 (Qld)* (“**Petroleum and Gas Act (Qld)**”) which came into force on 31 December 2004.⁶⁹ The Petroleum and Gas Act (Qld) is described as “An Act about exploring for, recovering and transporting by pipeline, petroleum and fuel gas and ensuring the safe and efficient carrying out of those activities, and for other purposes”. This seemingly straightforward agenda has manifested itself in a piece of legislation that is more than 600 pages long, with 938 sections (and two schedules).

Like the Petroleum Act (SA), the Petroleum and Gas Act (Qld) expressly authorises the injection and storage of carbon dioxide⁷⁰ in “natural underground reservoirs”⁷¹. These rights are authorised activities that attach to a petroleum lease granted pursuant to the Petroleum and Gas Act (Qld).⁷² The Petroleum and Gas Act also provides:

- the holder of an exploration title (referred to as an “authority to prospect”) with the right to carry out activities for the purpose of finding and testing natural underground reservoirs;⁷³ and
- for the holder of a petroleum lease to make an agreement with a third party to conduct underground storage activities within the lease area.⁷⁴

However, unlike the Petroleum Act (SA), the Petroleum and Gas Act (Qld) provides that a petroleum lease has a limited term of 30 years.⁷⁵ Further, while the Petroleum

⁶⁷ For a general discussion of these risks see McLaren and Fahey, above n 1.

⁶⁸ Under the *Petroleum Act 2000 (SA)* there is a general requirement to carry out activities with due care and in accordance with good industry practice: See section 87. See also, section 111(1) which provides for a general liability to the Crown for environmental rehabilitation.

⁶⁹ Importantly, the *Petroleum and Gas (Production and Safety) Act 2004 (Qld)* does not replace the existing *Petroleum Act 1923 (Qld)* in relation to certain pre-existing petroleum tenures. The reason for this approach is explained on page 2 of the *Explanatory Notes to the Petroleum and Gas (Production and Safety) Bill 2004 (Qld)* as follows: “During the development of the Bill, it became apparent that any interference with the rights enjoyed by holders of exploration and production tenure over land affected by native title, would trigger the right to negotiate provisions under the Native Title Act 1993 (Cwlth). Without the retention of the Petroleum Act 1923, exploration and production on these tenures would cease until the native title issues were resolved. The consequences of this would have been a major disruption of supply to domestic and industrial consumers and a potential loss of over \$50 million in royalty annually, until native title was resolved. Accordingly, a decision has been taken to retain the Petroleum Act 1923, albeit subject to amendment.”

⁷⁰ Carbon dioxide is a “prescribed storage gas”: see *Petroleum and Gas (Production and Safety) Act 2004 (Qld)* section 12.

⁷¹ “Natural underground reservoir” is defined in the *Petroleum and Gas (Production and Safety) Act 2004 (Qld)* as a part of a suitable geological structure including one that has been modified: see section 13. Modification does not include the excavation of a man-made cavity in a geological formation for the production or storage of petroleum: *Explanatory Notes to the Petroleum and Gas (Production and Safety) Act 2004 (Qld)*, 10.

⁷² See *Petroleum and Gas (Production and Safety) Act 2004 (Qld)* section 109(1)(d) which provides that the activities that a leaseholder may carry out include “evaluating, developing and using natural underground reservoirs for petroleum storage or to store prescribed storage gases, including, for example, to store petroleum or prescribed storage gases for others.”

⁷³ *Petroleum and Gas (Production and Safety) Act 2004 (Qld)* section 32(1).

⁷⁴ *Petroleum and Gas (Production and Safety) Act 2004 (Qld)* Part 6.

and Gas Act (Qld) does not expressly deal with ownership of stored carbon dioxide during the term of a petroleum lease, it provides that, at the end of a petroleum lease, the stored carbon dioxide will become the property of the Crown in right of the State unless the owner of the carbon dioxide provides a notice of claim in the prescribed form.⁷⁶

In addition, the Petroleum and Gas Act (Qld) requires the owner of stored carbon dioxide to pay the Storage rent as prescribed by regulation.⁷⁷ Whilst the drafting is not entirely clear, it appears that this provision only applies after a petroleum lease has ended, and not during a term during which a lease is in effect.⁷⁸

Like the Petroleum Act (SA), the Petroleum and Gas Act (Qld) contains a commerciality test, in this case for the holder of an authority to prospect to transition to a petroleum lease.⁷⁹ The relevant requirement is that “a natural underground reservoir in the area is, or is likely to have, commercial storage potential”.⁸⁰ Again, it is worth questioning how these commerciality requirements might apply where it is proposed that a petroleum lease will be used solely for underground storage of carbon dioxide as part of a geosequestration project.

Finally, the comments made above in relation to the Petroleum Act (SA) regarding the focus of the relevant provisions on *storage*, rather than *disposal*, apply equally to the Petroleum and Gas Act (Qld). Although the Petroleum and Gas Act (Qld) does account for ownership rights in stored gas at the end of a petroleum lease, there are no specific provisions that deal with liability for stored carbon dioxide either during or at the end of a petroleum lease or ongoing monitoring of stored gas beyond the end of the petroleum lease.⁸¹

An amendment in December 2005 of the *Petroleum and Gas (Production and Safety) Regulation 2004* allowed for CCS testing in Queensland. The *Petroleum and Gas (Production and Safety) Act 2004* allows for the evaluation or testing of underground sites for geosequestration, on a particular block of the authority to prospect, under section 32(1)(d). The Act also provides for transportation of carbon dioxide by pipeline and storage by a petroleum leaseholder in underground repositories. The current legislation provides a potential framework for the regulation of CCS. Currently in Queensland there is no regulatory framework for the long-term

⁷⁵ *Petroleum and Gas (Production and Safety) Act 2004* (Qld) section 123(2)(b). Note, however, that a petroleum lease may be renewed for terms which, in aggregate with previous terms, take the total term of the petroleum lease beyond 30 years.

⁷⁶ *Petroleum and Gas (Production and Safety) Act 2004* (Qld) section 214. Owners of stored gas must pay rent to the State while the area including the reservoir is not leased: section 227. Any new leaseholder has an obligation to negotiate with the owners of the stored gas to reach a storage agreement: section 222.

⁷⁷ *Petroleum and Gas (Production and Safety) Act 2004* (Qld) section 227.

⁷⁸ This interpretation is supported by the *Explanatory Notes to the Petroleum and Gas (Production and Safety) Bill 2004* (Qld): see 62.

⁷⁹ See, eg *Petroleum and Gas (Production and Safety) Act 2004* (Qld) section 95.

⁸⁰ Interestingly, the *Explanatory Notes to the Petroleum and Gas (Production and Safety) Bill 2004* (Qld) states that the reason for this commerciality test is as “a mechanism for the State to manage its petroleum resources to meet the needs of the community”: see 29. This might suggest that “commerciality” means something more than merely ‘profit’ or pure commercial gain.

⁸¹ During the term of a petroleum lease the relevant holder would need to comply with the general responsibility provisions under the *Petroleum and Gas (Production and Safety) Act 2004* (Qld), including complying with an approved development plan and having in place safety management plans: see section 108.

monitoring of stored CO₂ (including during the project and post closure) and no provisions for long-term liability.

In Queensland, it is now proposed that a new chapter be inserted into the *Petroleum and Gas (Production and Safety) Act 2004* to regulate this emerging area of industry. This would in turn recognise that geosequestration tenure is different to petroleum tenure. The proposed CCS tenure model provides for the grant of a CCS Exploration Permit, a CCS Exploration Permit for Retention-Potential Commercial Area and a CCS Storage Lease.⁸²

5.3.3 An alternative model: *Barrow Island Act 2003* (WA)

The model chosen by the South Australian and Queensland Governments involving the adaptation of petroleum legislation to provide for the underground storage of petroleum and other ‘regulated substances’ (including carbon dioxide) can be contrasted with the stand-alone project-specific approach to regulating the underground storage of carbon dioxide which has been adopted in Western Australia.

The relevant project is the proposed development of the natural gas reserves of the Gorgon and Greater Gorgon gas fields located 130 kilometres offshore Western Australia. The project involves major LNG and domestic gas developments, including the injection and indefinite storage of up to 125 million tonnes of carbon dioxide (which will be stripped from the natural gas produced from the reserves to meet commercial specifications) over the life of the project in a natural underground geological formation located under Barrow Island.⁸³

To facilitate the Gorgon project, the Western Australian Parliament has enacted the *Barrow Island Act 2003* (WA) (“**Barrow Island Act**”) in order to, among other things, “make provisions as to the conveyance and underground disposal of carbon dioxide recovered during gas processing on Barrow Island.”⁸⁴ Under the Barrow Island Act, approval is required before any carbon dioxide is injected into an underground reservoir or other subsurface formation.⁸⁵ Any application to dispose of carbon dioxide:

- must be accompanied by information including details of the geology of the underground reservoir or other subsurface formation, the rate and methods of proposed disposal, and the capability of the proposed storage formation;⁸⁶ and
- can be approved subject to any condition or restriction, including conditions as to the payment of money to the State, indemnification of the State and the transferability or otherwise of the approval.⁸⁷

⁸² See *Carbon dioxide geosequestration tenure administration: discussion paper* (State of Queensland (Department of Mines and Energy): 2007) available at http://www.dme.qld.gov.au/zone_files/Mines/ccs_discussion_paper.pdf (visited 21 August 2007).

⁸³ See the *Western Australian Oil and Gas Review 2005*, a report released by the Government of Western Australia Department of Industry and Resources and available at www.doir.wa.gov.au (visited 27 July 2007). See also www.gorgon.com.au. The injection and storage aspects of the Gorgon project are closely analogous to the activities that would occur in a geosequestration project attached to a carbon dioxide producing stationary energy source.

⁸⁴ See the recitals to the *Barrow Island Act 2003* (WA).

⁸⁵ *Barrow Island Act 2003* (WA) section 13(1).

⁸⁶ *Barrow Island Act 2003* (WA) section 13(2).

⁸⁷ *Barrow Island Act 2003* (WA) section 13(6). In addition, section 11 of the *Barrow Island Act 2003* (WA) has effectively amended the definitions of ‘petroleum’ and ‘pipeline’ in section 4 of the *Petroleum Pipelines Act 1969* (WA) to allow the transport of carbon dioxide by pipeline to a place on Barrow Island

In addition, the Barrow Island Act ratified the Gorgon Gas Processing and Infrastructure Project Agreement (“**Gorgon State Agreement**”) which clarifies the duties and responsibilities of the parties associated with the Gorgon project.⁸⁸ Among other things, the Gorgon State Agreement provides:

- general requirements to report to, and consult and cooperate, with the Western Australian Government;⁸⁹
- a requirement to comply with relevant environmental legislation and to minimise environmental disturbance and impact on conservation values;⁹⁰ and
- an indemnity for the benefit of the State in respect to third party claims.⁹¹

6 LEGISLATIVE POWER TO REGULATE ONSHORE GEOSEQUESTRATION ACTIVITIES

6.1 Onshore

A number of issues arise in respect to each of the State’s powers to legislate in respect to the injection and storage of carbon dioxide conducted onshore.

At common law, there is a presumption that the owner of land is entitled to everything that lies on the surface and beneath it.⁹² As previously outlined, this presumption is subject to statutory provisions in each of the onshore petroleum regimes that vest ownership of petroleum in place in the Crown in right of the State.⁹³ The presumption is also subject to:

- the prerogative right of the Crown to gold and silver;⁹⁴
- statutory depth limitations to title that have been enacted in various jurisdictions;⁹⁵ and

for the purposes of disposing of the carbon dioxide in an underground reservoir or other sub-surface formation. The transport aspect of a geosequestration project is not considered in this paper.
⁸⁸ The Gorgon State Agreement is contained in Schedule 1 to the *Barrow Island Act* 2003 (WA). The Gorgon State Agreement was entered into on 9 September 2003 and was ratified by the Western Australian Parliament under the *Barrow Island Act* 2003 (WA), which came into effect on 20 November 2003. State agreements have been common methods for development of resource projects in Western Australia. Being fixed in legislation, the rights and obligations created by the Gorgon State Agreement cannot be altered by contract between the parties or by any method other than an amendment of the State Agreement in accordance with its provisions: see *Barrow Island Act* 2003 (WA) s 3 (definition of “the Agreement”).

⁸⁹ See clauses 4 and 31.

⁹⁰ See clauses 5 and 14.

⁹¹ See clause 27(1) which provides that: “*Unless the Minister and the Joint Venturers otherwise agree in writing, the Joint Venturers shall indemnify and keep indemnified the State and its servants agents and contractors in respect of all actions suits claims demands or costs of third parties arising out of or in connection with any work carried out by or on behalf of the Joint Venturers pursuant to this Agreement or relating to their activities hereunder.*”

⁹² The maxim ‘*cujus est solum, ejus est usque ad coelum et usque ad inferos*’ applies. That is, ‘to whomsoever the soil belongs, he owns also to the sky and to the depths’: applied in a mining context in *Commonwealth v New South Wales* (1923) 33 CLR 1 at 23.

⁹³ See the discussion in sections 5.3.1(b) and 5.3.2, above.

⁹⁴ *R v Earl of Northumberland* (1567) 1 Plowd 310; *Wilkinson v Proud* (1843) 11 M & W 33.

⁹⁵ For example, the *Land Act* 1958 (Vic) provides that title beneath the surface only extends to 15 metres for grants made after 1891 (subject to any express depth limitation in the original Crown grant). Compare

- other ‘vesting’ legislation, in respect to, for example, mineral resources⁹⁶ and ground water.⁹⁷

It follows that the injection and storage of carbon dioxide for geosequestration will involve the use of Crown owned land, privately owned land or a combination of both.

It should be noted, however, that even in circumstances where an underground geological structure into which the injection of carbon dioxide is proposed is located on private land, the Crown is likely to have rights to prevent the landholder or others to use that structure where the structure is a depleted petroleum reservoir or coal mine. This is because it would be expected that the structure would contain residual petroleum or coal, interference of which would amount to an infringement of the Crown’s property rights in the petroleum or coal.⁹⁸ In this way the Crown would have effective control over the use of the structure.

In circumstances where an underground geological structure suitable for geosequestration is located on Crown land (or the structure is controlled by the Crown as discussed above), the grant of any authority to inject and store carbon dioxide will be subject to the rule that State Governments and their Ministers cannot deal with Crown property unless under and in accordance with power conferred by statute.⁹⁹

As discussed earlier, the Petroleum Act (SA) and the Petroleum and Gas Act (Qld) clearly empower the relevant State Government and Minister to authorise the commercial (temporary) storage of gas, including carbon dioxide. However, it is not clear that these statutes empower the grant of an authorisation to permanently geosequest carbon dioxide in an underground structure in respect to which the Crown has a proprietary interest. The act of storing a gas for later withdrawal is very different from rendering an underground structure useless (other than to hold the geosequestered carbon dioxide) or permanently devaluing the Crown’s proprietary rights in any residual petroleum or coal. Clearly, specific legislative provisions authorising the injection and indefinite storage of carbon dioxide is required.

Where the relevant underground structure is located on private land and the structure is not otherwise subject to Crown control, any government authorisation to inject and store carbon dioxide must be the subject of a clear legislative modification of the private rights of the landholder.¹⁰⁰

The Petroleum Act (SA) is unambiguous: it provides that property in all natural reservoirs located in South Australia is vested and continues to be vested in the Crown.¹⁰¹ The Petroleum and Gas Act (Qld) is less clear, and it is possible that a disaffected landholder may be able to challenge a Minister’s authority to permit the underground storage of gas on the basis that it involves an infringement of the landholder’s private proprietary rights in the structure.¹⁰² Clearly, the South Australian approach is to be preferred.

the position in New South Wales where there is no depth limitation (unless otherwise stated in an original Crown grant).

⁹⁶ See, for example, *Mineral Resources (Sustainable Development) Act* 1990 (Vic), section 9.

⁹⁷ See, for example, *Water Act* 1989 (Vic) section 7.

⁹⁸ See Willcocks, above n 40 at 86-87.

⁹⁹ *Cudgen Rutile (No. 2) Pty Ltd v Chalk* [1975] AC 520. The legal basis for this power and the limitations upon it in each Australian State is found in the State Constitution. For a detailed discussion of the application of this rule in relation to underground natural gas storage, see Willcocks, above n 40 at 85-86. See also, Kennedy, above n 40 at 530-531.

¹⁰⁰ *Wade v NSW Rutile Mining Company Ltd and Others* (1969) 121 CLR 177. See also Kennedy, above n 40 at 530-531.

¹⁰¹ See the *Petroleum Act* 2000 (SA) sections 4(1) (definition of “regulated resource”), 5(1).

¹⁰² See Kennedy, above n 40 at 530-531.

6.2 Offshore

In relation to injection and storage of carbon dioxide in offshore areas, the Commonwealth has sovereignty in respect of the territorial sea,¹⁰³ and sovereign rights in respect to:

- the exclusive economic zone for the purpose of exploring and exploiting, conserving and managing the natural resources (living and non-living) of the waters, seabed and subsoil, and has jurisdiction regarding establishment and use of artificial islands, installations and structures, marine scientific research and protection and preservation of the marine environment;¹⁰⁴ and
- the continental shelf for the purpose of exploring and exploiting living and non-living natural resources.¹⁰⁵

There is a question as to whether the power to grant rights to inject and store carbon dioxide (and to conduct other associated activities such as the construction of pipelines, platforms and other plant) fall within the Commonwealth's sovereign rights. It is beyond the scope of this paper to consider this question in detail, other than to observe that, ultimately:

- this is a question of the proper interpretation of the relevant international conventions to which Australia is a party and the Commonwealth laws giving effect to these conventions;¹⁰⁶ and
- the conclusion may differ in respect to geosequestration activities within the exclusive economic zone and activities conducted within the balance of the continental shelf.

7 CONCLUSION

As the release of a final statement of the *Regulatory Guiding Principles* by the Ministerial Council of Mineral and Petroleum Resources and the imminent release of amendments to the Offshore Petroleum Act indicate, the statutory regulation of Australian geosequestration projects is squarely on the agenda of each of the State and Commonwealth Governments.

Australia's petroleum regime appears to be sufficiently flexible to respond to the challenges of underground natural gas storage (and, with relatively minor amendments, seem capable of providing an entirely satisfactory regime for that purpose). However, the indefinite geosequestration of carbon dioxide raises some very different issues to those that arise in the

¹⁰³ *Seas and Submerged Lands Act 1973* (Cth) sections 3(1) (definition of 'continental shelf'), 11. The constitutional validity of the *Seas and Submerged Lands Act 1973* (Cth) was upheld by the Australian High Court in *New South Wales v Commonwealth (Seas and Submerged Lands Case)* (1975) 135 CLR 337. As outlined earlier, following an agreement negotiated between the Commonwealth Government and the States in 1979, the Commonwealth conferred power on the States to make laws for matters including mining operations in respect to coastal waters and granted them proprietary rights to the seabed.

¹⁰⁴ Article 56(1)(a)(b) of the *United Nations Convention on the Law of the Sea* which is enacted by the *Seas and Submerged Lands Act 1973* (Cth).

¹⁰⁵ Article 79(2) of the *United Nations Convention on the Law of the Sea*.

¹⁰⁶ For example, in respect to the continental shelf, the relevant question is whether the injection and storage of carbon dioxide for an indefinite term involves the "exploitation" of a "natural resource": See Willcocks, above n 40 at 83. Daintith and Willoughby believe that it is the property of porosity rather than a resource (which connotes a tangible substance) of the sub-soil that is being exploited. Contrary to popular understanding, petroleum reservoirs are not vast underground pools. They are sections of porous rock or sand containing oil or gas in the pore spaces. The rock must be porous and permeable (characteristics of sedimentary rocks like limestone and sandstone) so that carbon dioxide can move through it to be commercially exploitable: See Terence Daintith and Geoffrey Willoughby, (1984) *Manual of United Kingdom Oil and Gas Law* 151.

‘banking’ of petroleum undertaken in response to fluctuating demands for gas. It is hoped that the proposed amendments to the Offshore Petroleum Act will deal with these adequately.

While there may be merit in having laws for geosequestration uniform as between the States, it is doubtful that this will occur onshore given practical impediments.

The management of Australia’s natural resources (including its underground geological structures) cannot be understood without reference to the Australian constitutional system and the respective powers of the Commonwealth, State and Territory governments. The scope of these powers, which is a matter of constitutional as well as international law, will need to be considered as part of any legislative reform to allow (or further allow) for the injection and storage of carbon dioxide as part of geosequestration projects.